INVASIVE SPECIES CONTROL PROJECTS (R1 SMALL GRANTS)
FY 2013 FINAL REPORT

Project Title: Corallimorph control and eradication at Palmyra Atoll NWR

Station: Palmyra Atoll National Wildlife refuge

Contact Person: Amanda Pollock

Project Description:
The coral reefs at Palmyra Atoll National Wildlife Refuge (Palmyra) are under attack from an invasive corallimorph, *Rhodactis howesii*, an anemone like species that is out competing corals and smothering the reef. *R. howesii* were seen increasing in number on the western terrace of Palmyra after a long-line fishing vessel wrecked in the area in 1991. Available data including two surveys of the infestation in 2007 and 2011 suggests the vessel is fueling the growth of *R. howesii* perhaps by releasing iron, a limited element in seawater. The corallimorph is currently spreading over once pristine coral reefs, killing and smothering corals and turning an area once rich in species diversity into a monotypic blanket of corallimorph. Recent surveys in 2011 show that *R. howesii* has now spread over 250 acres of reef smothering corals across the western terrace and on the north and south fore reefs of the atoll. The speed at which the corallimorph is spreading poses a serious threat to the health of the reefs surrounding Palmyra and the coral reef ecosystem as a whole. In the past few years several control and eradication methods have been trialed, three of which have been proven successful. One of these (Tarp method) involves killing all organisms on the benthos using bleach and tarps and would be suitable for eradication in areas where corallimorph cover exceeds 60%. Pilot studies using this method show that once cleared from the substrate, corallimorph do not recover for at least a year. A second method (focal treatment) involves killing individual corallimorph using calcium bicarbonate and is more suited to eradication in areas where corallimorph cover is equal to that of corals (thereby limiting collateral damage). Pilot studies also reveal that reef fish will eat corallimorph. We hypothesize, therefore, that if large enough areas are treated, local predators will limit corallimorph densities and allow recovery of the reef.

Invasive Species Targeted: *Rhodactis howesii*

Project Completion Date or Estimated Completion Date:
This is an ongoing project with many stages. The first stage included the removal of the Hui Feng No. 1 ship wreck, and that is currently under way and will be completed by January 2014. The second stage of the project is to remove and control the corallimorph which has spread over the western terrace. Due to a lack of refuge staffing in 2013, the corallimorph removal phase has been delayed a bit, and Pacific Reefs NWRC staff are planning a corallimorph removal trip for the spring of 2014. This will be the first of many corallimorph removal trips planned for the future, with a project completion date in 2016. Essential Fish Habitat consultation with the National Marine Fisheries Service may be needed (among other permits) for a large removal and control action, and the Service is looking into this requirement.

Project Results:
The ultimate goal of the corallimorph control project is to scale up initial control efforts by treating 20 acres at the periphery of the expansion with focal treatment, and 10 acres in select portions of the high density areas using tarp method. At this time, due to staffing restrictions, there are not many results to

report. Focal treatment in high coral cover areas continues at site RT-10 with great results. Removal patches that were treated in the winter of 2012 show coral tissue regrowth and little to no corallimorph regrowth. These removal sites were monitored throughout 2013 and continued to look good with Crustose Coralline Algae (CCA) and turf algae recruiting to the bare substrate left when the corallimorph was removed, showing efficacy of control measures. Work was done in July and August, in collaboration with the Scripps Institution of Oceanography, on mapping the extent of the corallimorph with photomosaic methods to develop a high resolution map of the western terrace, and the existing magnitude invasion of the corallimorph. These maps will give the Service a high revolution view of the state of the Western Terrace, and show sites at the fore front of the invasion that can be treated first when the control team comes down in 2014. Work was also done on the genetics of the corallimorph and quantifying the densities around the wreck itself.

Number of Acres Treated: 0.5

Number of Acres Inventoried and/or Mapped: 22 acres of the western terrace have been mapped for both coral cover and invasive corallimorph cover. This has been done in conjunction with the Inventory and Monitoring grant.

Total Grant Amount: $40,000

Breakdown of Expenditures:

Category	**Total $ Spent**	**% of Total Grant**
Equipment/Supplies	0	0
Chemical	0	0
Biocontrol Agents	0	0
Travel	40,000	100
Biotech/Contractor Salary	0	0
Restoration Materials	0	0
Other (Describe)	0	0
TOTAL	40,000	100

Due to a lack of staff to carry out the intended work in 2013, 100% of the grant was put into a future plane flight with Ashville Jet Charters. This flight will be used to bring a team of divers down to Palmyra in the spring or summer of 2014 to participate in control and removal efforts. The cost of one round trip flight to Palmyra from Honolulu is $40,000. I look forward to sharing the results from this future invasive species control trip.